

REMARKS/ARGUMENTS**1. Request for Continued Examination:**

The applicant respectfully requests continued examination of the above-indicated application as per 37 CFR 1.114.

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The amendments made to the claims in the above section are over the original claims presented in the application.

2. Rejection of claim 1:

10 Pertaining to claim 1, Satya teaches a method for defect review comprising following steps:

Providing a wafer with a plurality of defects;

Performing a defect inspection to detect the defect; performing an automatic defect classification according to a database to separate the defects into a plurality of defect types; and performing a defect review;

15 wherein each defect type has different sampling ratios in the defect review according to its influence degree of process yield (see column 7, lines 14-48).

Response:

20 Claim 1 has been amended to overcome this rejection. Claim 1 now includes the step of "adjusting sampling ratios according to an influence degree each defect type has on process yield". Furthermore, claim 1 has also been amended to recite the step of "performing a defect review using the adjusted sampling ratios." All claim amendments are supported in paragraph 0019 of the specification, and no new matter
25 is added.

According to the amended claim 1, the present application method contains the following characteristics: (1) performing an *automatic defect classification according to a database to separate the defects detected from a defect inspection into a plurality of defect types*; (2) *adjusting sampling ratios according to an influence degree each defect type has on process yield*; and (3) *performing a defect review for each defect*

type using the adjusted sampling ratios. In other words, the function of the database of the claimed application is to provide a criterion for the defects classification and for adjusting the sampling ratio in the defect review according to the defect's influence degree on the process yield.

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In U.S. Pat. No. 6,445,199, Satya et al. provide a inspection system which can operate in several mode such as array, die-to-die and die-to-database, wherein the database is a source of the signal that is equivalent to the expected die format. And according to the column 7, lines 14-48 of Satya et al., the significant benefits are 10 achieved by scanning with a continuously moving stage. That is, measurements of the sample are obtained while the stage (or beam) is moving.

Particularly speaking, the function of the database in the Satya et al.'s teaching is a source of the signal that is equivalent to the expected die format. A signal from one 15 die derived from the electron microscope is compared with a signal that is derived from the database. *The database may include design data that is used to make the die and to generate a plurality of perfect images of how the die would appear without any defects.* (column 5, lines 57-62), and is different from the database of claim 1 of the present application that contains pluralities of defect types. Obviously the functions 20 and the spirits between the two databases are distinct.

Accordingly, Satya et al. never teach the same function of the database, adjusting sampling ratios according to an influence degree each defect type has on process yield, or performing a defect review using the adjusted sampling ratios. Since Satya does not teach all of the limitations in claim 1, Satya does not anticipate claim 1, and 25 reconsideration of claim 1 is respectfully requested.

3. Rejection of claim 2:

Pertaining to claim 2, Satya teaches the method of claim 1 wherein the database 30 comprises information about the plurality of defect types and defect information corresponding to each defect type (see FIG. 3).

Response:

FIG. 3 of '199 is a flowchart illustrating a process and test procedure in accordance with one of the embodiments of Satya et al.'s teaching. As shown in FIG. 3, a sequence of initial manufacturing process steps are performed and an electron beam inspection is performed. The detected signals are processed to determine whether the inspected subject such as a substrate has defects or not. The detected defect is classified and analyzed and the resulting data can be used to eliminate defect-causing process conditions. And if it shows nondestructive, the substrate can be returned to the process line for further processing. (column 8, lines 24-36 and column 9, lines 8-14). According to '199 patent, the defects are classified into two categories: destructive, used to eliminate the defect-causing process conditions, and nondestructive, which will return the detected subject to the process line for further processing.

However, claim 2 of the instant application recites a plurality of defect types for a complicated semiconductor manufacturing process. The defect classified into a plurality of defect types is not for determining whether a detected subject should be returned to the process line or not, but for being reviewed afterwards. Applicant asserts that reciting the plurality of defect types and the information corresponding to each defect type serves to emphasize the advantageous characteristic of the invention and distinguish it from the prior art. Therefore, reconsideration of claim 2 is respectfully requested.

4. Rejection of claim 3:

Pertaining to claim 3, Satya teaches the method of claim 2 wherein the defect information comprises the influence degree of the process yield of each defect type.

Response:

Claim 3 depends on claim 2, and should be allowed if claim 2 is found allowable.

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5. Rejection of claim 4:

Pertaining to claim 4, Satya teaches the method of claim 3, wherein the database

separates the defect types into killer defects and non-killer defects according to the influence degree of the process yield (column 31, lines 3-14).

Response:

5 Claim 4 depends on claim 3, and should be allowed if claim 3 is found allowable.

6. Rejection of claim 5:

Pertaining to claim 5, Satya teaches the method of claim 4 wherein the sampling
10 ratio of the killer defects in the defect review is larger than that of non-killer defects
(column 31, lines 25-51).

Response:

15 In claim 5 of the present application, killer defects that influence the process
yield are determined to have larger sampling ratio than that of non-killer defects in a
defect review, so that the capture of the killer defects is maximized.

According to Satya's teaching, the voltage contrast testing is utilized to
optimize other test devices. For a particular type of fabrication process will typically
20 have a particular defect footprint, a processor may be utilized to efficiently compare
the data maps to signature patterns and to identify a particular defective manufacturing
process. The voltage contrast data may also be utilized in conjunction with optical
data to determine which manufacturing process to inspect so that the capture of killer
defects is maximized (column 31, lines 25-51). Therefore, *Satya et al. only teach
utilizing optical data with voltage contrast data to determine which manufacturing
process is defective or which process needs to be inspected but not mention to perform
a defect review for a killer defect with a sampling ratio larger than a sampling ratio of
a non-killer defect in a defect review.*

30 Accordingly, the applicant believes there is distinction between the prior art
and the present application. Therefore reconsideration of claims 5 is politely requested.
Furthermore, claim 5 depends on claim 4, and should be allowed if claim 4 is found

allowable.

7. Rejection of claim 6:

Pertaining to claim 6, Satya teaches the method of claim 3 wherein the database
5 separates the defects into pre-layer defects and adding defects, and further separates
the adding defects into killer defects and non-killer defects (see column 31).

Response:

Claim 6 depends on claim 3, and should be allowed if claim 3 is found
10 allowable.

8. Rejection of claim 7:

Pertaining to claim 7, Satya teaches the method of claim 6 wherein the defect
review focuses on the adding defects.

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Response:

Claim 7 depends on claim 6, and should be allowed if claim 6 is found
allowable.

20 **9. Rejection of claim 8:**

Pertaining to claim 8, Satya teaches the method of claim 1 wherein after finishing
the defect inspection, a judgment of cluster defects is performed and a defect review
with a high sampling ratio is performed on the cluster defects if the cluster defects
exist.

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Response:

From the applicant's paragraph [0023], engineers can manually adjust the
sampling ratios according to any special features or excursion cases such as cluster
defect observed in the defect inspection then perform a defect review with high
30 sampling ratio of the cluster defect, which is often found in the corner of the
semiconductor wafer. Applicant has no way to find such characteristic from the '199
patent and asserts that reciting judgment of cluster defects and defect review with a

high sampling ratio on the cluster defects emphasize the advantageous characteristic of the invention and distinguish it from the prior art.

10. Rejection of claim 9:

5 Pertaining to claim 9, Satya teaches the method of claim 1 wherein the database is updated according to the result of the defect review after finishing the defect review.

Response:

According to the column 14, line 65 to column 15, line 7 of '199 patent, the
10 generated perfect image and/or set of predetermined intensity values or truth tables in database, along with the corresponding test structures, may also be provided to the customer so that they may easily inspect the corresponding test structure..... However, the die-to-database, die-to-perfect image, and die-to-truth-table techniques represent a more efficient inspection procedure since a perfect die or die portion does
15 not have to be found for comparison to the die under test. Accordingly the database in '199 patent serves as a source of the signal that is equivalent to the expected die format and is fixed to a particular inspection.

However, the database provided by the claimed application is updated
20 according to the result of the defect review after finishing the defect review. Then the automatic defect classification and the defect review can rework to get an optimized result for improving the sensitivity and accuracy of the defect root cause analysis. Applicant asserts that reciting the update function serves to emphasize the advantageous characteristic of the invention and distinguish it from the prior art. And
25 claim 9 depends on claim 1, and should be allowed if claim 1 is found allowable.

In light of the amendment to claim 1 and the patentable differences explained above, the applicant believes that all of the claims 1-9 are now patentable over the cited prior art. Reconsideration of claims 1-9 is respectfully requested.

Sincerely yours,

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10 Note: Please leave a message in my voice mail if you need to talk to me. (The time in D.C. is 13 hours behind the Taiwan time, i.e. 9 AM in D.C. = 10 PM in Taiwan.)